

# Prevalence of cognitive impairment in elderly population residing in an urban area of Belagavi

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## ABSTRACT

**Context:** Cognitive impairment (CI) is emerging as an important health problem of the elderly population in India. As the impact of this illness at various levels is not well understood, so situation analysis is the need of the hour. **Aims:** (1) To know the prevalence of CI in elderly population residing in an urban area. (2) To assess the burden of health care among the care givers. **Settings and Design:** A cross-sectional study was carried out among 770 elderly aged  $\geq 60$  years residing in two Urban Health Centres of Belagavi District. **Methods and Material:** Socio-demographic profile of the participant was collected using a predesigned and pretested questionnaire by personal interview at the participants' residence. To assess the CI and burden of healthcare, Mini Mental State Examination and Zarit Caregiver Burden Scale were used, respectively. **Statistical Analysis Used:** IBM SPSS version 22 was used. Chi square test and Fisher's Exact test were applied. **Results:** The overall prevalence of CI was 8.4% in our study. The risk factors noted for CI were advancing age, female sex, unmarried or widow/widower, illiterate, not working presently, staying alone, and poverty. Out of 65 caregivers, 67.7% of them had mild or moderate burden of caring for the cognitively impaired elderly. **Conclusions:** It is important to assess older people for any CI, when planning geriatric health care. Priority must be given to the older age group and female, as they are more vulnerable to CI.

**Keywords:** Cognitive impairment, elderly, MMSE, prevalence

## Introduction

Cognitive impairment (CI) is when a person has trouble remembering, learning, concentrating, or making decisions that affect their daily life. The Dementia India Report estimated that 3.7 million people were affected by dementia in the year 2010<sup>[1]</sup> and this graph will continue to rise with time. The main concern is to avoid a situation where diseases like CI limit the life of an elderly. Much more in-home care and unpaid assistance by family will be needed in the future. Considering this background, the

present study was undertaken to study the prevalence of CI and the burden on the caregiver.

## Aims and Objectives

- (1) To know the prevalence of CI in elderly population residing in an urban area
- (2) To assess the burden of health care among the care givers.

## Subjects and Methods

A community based cross-sectional study was conducted among elderly population aged 60 years and above residing in Ashok Nagar and Rukmini Nagar Urban Health Centres (UHC) of Belagavi District, Karnataka. The sample size was calculated considering the prevalence of CI as 7.02%<sup>[2]</sup> and an absolute error of 1%. The population covered by UHCs was 68,799.

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According to the 2011 Census<sup>[3]</sup> people aged 60 years and above constitute 9% of the total population. Taking both the factors into consideration, the corrected sample size calculated was 770. People aged 60 years and above residing in urban areas were 6192. A sampling frame was prepared first using a random number table, 770 elderly were selected for the study. Ethical clearance was obtained from the Institutional Ethical Committee. (Ref. No. MDC/DOME/143 Dt. 03/05/2018).

**Inclusion criteria:** Persons aged  $\geq 60$  years who were permanent residents of the study area.

**Exclusion criteria:** People aged  $\geq 60$  years who were deaf/dumb/unable to read properly and who had any motor deficits that affect writing/drawing skills. **Data collection:** Written informed consent was obtained from the study subjects. Socio-demographic profile of the participant was collected using a predesigned and pretested questionnaire by personal interview at the participants' residence. To assess the cognitive impairment Mini Mental State Examination (MMSE)<sup>[4]</sup> was carried out. The scale has a total score of 30 and covers 5 domains of cognitive function namely, orientation, immediate memory, attention and concentration, delayed recall and language. A score more than or equal to 24 was considered as No CI. A score between 20 and 23, 10 and 19, and  $<10$  was Mild CI, Moderate CI, and Severe CI, respectively. For those participants' who were cognitively impaired their caregivers were assessed for burden using the Zarit Caregiver Burden Scale.<sup>[5]</sup> The scale has a total score of 88. A score between 0 and 20, 21 and 40, 41 and 60, and 61 and 88 was considered little or no burden, mild or moderate burden, moderate or severe burden, and severe burden, respectively.

## Data analysis

IBM SPSS version 22 was used for statistical analysis. Descriptive analysis was carried out by mean and standard deviation (SD) for quantitative variables, frequency, and proportion for categorical variables. Demographic factors were considered as primary outcome variables and CI was considered as primary explanatory variable. Categorical outcomes were compared using Chi square test and Fisher's Exact test and *P* value of 0.05 was considered statistically significant.

## Results

Out of 770 elderly population studied, 555 (72.1%) were between 60 and 70 years of age, followed by 71 and 80 years accounted for 174 (22.6%), and 41 (5.3%) were above 80 years of age. The mean  $\pm$  SD age was  $67.7 \pm 6.9$  years, median 66 years and ranged between 60 to 92 years. More than half of the (59.6%) study participants' were female, as women out live men after the age of 60 years and nearly 2/3<sup>rd</sup> (76.9%) of the study subjects were Hindu by religion. Regarding the marital status, most (91.4%) of the study subjects were married. Almost 263 (34.2%) elderly were retired from job and 118 (15.3%) were still working and keeping themselves active and healthy. Nearly 484 (62.8%) of the elderly had a good family support, that is they

were staying in three-generation and joint families. In relation to the literacy status of study population, about 1/4<sup>th</sup> (22.9%) were illiterate, 175 (22.7%) and 42 (5.5%) were graduate and postgraduate respectively. According to Modified BG Prasad Classification,<sup>[6]</sup> 572 (74.3%) belonged to Class I and II, remaining 198 (25.7%) to Socioeconomic classes III, IV, and V.

About 280 (36.4%) and 274 (35.6%) of the study participants had Diabetes Mellitus and Hypertension respectively. Regarding personal habits, out of 311 male elderly, 57 (18.3%) of them were smokers, 33 (10.6%) chewed tobacco and consumption of alcohol was noted in 28 (9.0%). Practicing active and healthy ageing 10.3%, 7.1%, and 12.9% of elderly had stopped smoking, chewing tobacco, and consuming alcohol, respectively.

The overall prevalence of CI was 8.4% in our study. Among them 51 (6.6%) had mild CI, 14 (1.8%) had moderate CI, and none had severe CI. The mean  $\pm$  SD MMSE score for CI and not CI elderly was  $20.2 \pm 3.18$  and  $28.9 \pm 1.69$  respectively. Assessment of cognitive domains revealed that the first one to be lost among our study population was attention and concentration (100%), followed by delayed recall (95.4%), orientation (76.2%), language (32.3%), and the last one was immediate memory (21.5%). The risk factors identified for prevalence of CI were advancing age, female sex, unmarried or widow/widower, illiterate, not working presently, staying alone, and poverty [Table 1]. Among studied risk factors, seven and two risk factors were significantly associated with CI on Univariate and Multivariate Logistics Regression analysis, respectively [Table 2 and 3]. Other factors like suffering from Hypertension or Diabetes Mellitus and Habits (Smoking and alcohol) were also studied but were not found to be statistically significantly associated with CI.

Out of 65 caregivers, the mean  $\pm$  SD age was  $39.8 \pm 15.0$  years, median 34 years and range of 19–72 years. Most (63.1%) of the caregivers belonged to the productive age group, 13 (20.0%) were young adults and 11 (16.9%) were themselves elderly caring for the CI elderly. Majority (83.1%) of caregiver were female. With respect to the relationship of cognitively impaired elderly with caregiver, 29 (44.6%) were daughter-in-law, 12 (18.5%) were spouse, 15 (23.1%) were grandchildren, least 9 (13.8%) were children. In relation to the education of the caregiver, 5 (7.7%) were illiterate, most of them (73.9%) had studied until primary and higher secondary level. With regards to the occupation of the caregivers, 12 (18.5%) were employed in private and government firms, 8 (12.3%) were students, they were managing health care burden along with their jobs and studies. Majority (69.2%) were homemakers who spent majority of their time in taking care of the cognitively impaired elderly and also doing their household activities. The caregivers of the cognitively impaired were assessed for the burden using the Zarit Caregiver Burden Scale. Majority 67.7% of the caregivers had mild or moderate burden of caring for the cognitively impaired elderly. Nearly 18.5% caregiver experienced moderate to severe burden and 13.8% little to no burden. The mean  $\pm$  SD burden

**Table 1: Association between socio-demographic factors and CI**

Variable	Cognitive impairment		Chi-square value	P
	Present	Absent		
Age (in years)				
60-65	20 (5.4%)	350 (94.6%)	34.287	<0.001
66-70	10 (5.4%)	175 (94.6%)		
71-75	14 (11.1%)	112 (88.9%)		
76-80	11 (22.9%)	37 (77.1%)		
>80	10 (24.4%)	31 (75.6%)		
Sex				
Male	15 (4.8%)	296 (95.2%)	8.838	0.003
Female	50 (10.9%)	409 (89.1%)		
Marital status				
Married	51 (7.2%)	653 (92.8%)	15.255	<0.001
Unmarried	2 (20.0%)	8 (80.0%)		
Widow/widower	12 (21.4%)	44 (78.6%)		
Religion				
Hindu	37 (6.3%)	555 (93.7%)	19.714	<0.0001
Muslim	25 (14.8%)	144 (85.2%)		
Christian	3 (33.3%)	6 (66.7%)		
Literacy status				
Illiterate	38 (21.6%)	138 (78.4%)	53.439	<0.001
Primary education	3 (2.7%)	109 (97.3%)		
Secondary education	10 (5.6%)	168 (94.4%)		
PUC* and Diploma	4 (4.6%)	83 (95.4%)		
Graduate	6 (3.4%)	169 (96.6%)		
Postgraduate	4 (9.5%)	38 (90.5%)		
Occupation				
Working	4 (3.4%)	114 (96.6%)	9.371	0.009
Retired	17 (6.5%)	246 (93.5%)		
Staying at home	44 (11.3%)	345 (88.7%)		
Type of family				
Joint	20 (16.3%)	103 (83.7%)	15.632	0.001
Three generation	30 (8.3%)	331 (91.7%)		
Couple	13 (4.7%)	261 (95.3%)		
Single	2 (16.7%)	10 (83.3%)		
Socio-economic status				
Class I	30 (8.9%)	307 (91.1%)	15.081	0.005
Class II	28 (11.9%)	207 (88.1%)		
Class III	2 (1.9%)	105 (98.1%)		
Class IV	3 (3.6%)	80 (96.4%)		
Class V	2 (25.0%)	6 (75.0%)		

\*PUC: Pre-University Course

score was  $32.2 \pm 8.6$ , median 34 and range of 11–47. The important reasons for caregiver burden noted in our study were: financial constraint because health care expenditure of elderly and other expenses of the house need to be managed, impact on physical and mental health because of the responsibility as they are the sole caregiver and feeling stressed because many of the caregivers were managing the household responsibilities along with caring for the elderly.

## Discussion

The overall prevalence of CI was found to be 8.4% in our study. Whereas, studies conducted in Kerala and Lucknow, stated that the prevalence was 14.95%<sup>[7]</sup> and 14.42%<sup>[8]</sup> respectively. A study done in Thiruvananthapuram, Kerala, states a prevalence of mild cognitive impairment as 26.06%.<sup>[9]</sup> The prevalence of CI

**Table 2: Univariate Logistic Regression**

Variable	Unadjusted OR*	95% CI <sup>†</sup> of OR	P
Age (in years)			
60 - 65	Ref		
66 - 70	1.00	0.46 - 2.18	1.000
71 - 75	2.19	1.07 - 4.47	<b>0.032</b>
76 - 80	5.20	2.31 - 11.69	<b>&lt;0.001</b>
>80	5.65	2.43 - 13.12	<b>&lt;0.001</b>
Sex			
Male	Ref		
Female	2.41	1.33 - 4.38	<b>0.004</b>
Marital status			
Married	Ref		
Unmarried	3.20	0.66 - 15.47	0.148
Widow / widower	3.49	1.74 - 7.03	<b>&lt;0.001</b>
Religion			
Hindu	Ref		
Muslim	2.60	1.52 - 4.47	<b>0.001</b>
Christian	7.50	1.80 - 31.19	<b>0.006</b>
Literacy status			
Illiterate	2.62	0.88 - 7.79	0.084
Primary education	0.26	0.06 - 1.22	0.088
Secondary education	0.57	0.17 - 1.90	0.356
PUC <sup>‡</sup> and Diploma	0.46	0.11 - 1.93	0.287
Graduate	0.34	0.09 - 1.25	0.105
Postgraduate	Ref		
Occupation			
Working	Ref		
Retired	1.97	0.65 - 5.99	0.232
Staying at home	3.64	1.28 - 10.34	<b>0.016</b>
Type of family			
Joint	Ref		
Three generation	0.47	0.25 - 0.86	<b>0.014</b>
Couple	0.26	0.12 - 0.54	<b>&lt;0.001</b>
Single	1.03	0.21 - 5.06	0.971
Socio-economic status			
Class I	Ref		
Class II	1.38	0.80 - 2.39	0.242
Class III	0.20	0.05 - 0.83	<b>0.027</b>
Class IV	0.38	0.11 - 1.29	0.121
Class V	3.41	0.66 - 17.65	0.143

\*OR- Odds Ratio, <sup>†</sup>CI- Confidence Interval, <sup>‡</sup>PUC- Pre-University Course

in India is showing an upward trend since 1990s.<sup>[2,7-9]</sup> According to the extensive studies done in both developed and developing countries, it is proven that there is a higher prevalence rate of CI in developing countries. Dementia is more common in groups with low educational attainment, which can be one of the causes of a higher prevalence in developing countries.<sup>[10]</sup>

Age ( $\chi^2 = 34.287$ ,  $p < 0.001$ ) and sex ( $\chi^2 = 8.838$ ,  $P = 0.003$ ) of the study participants were found to be statistically significantly associated with CI in our study. These factors were also found to be associated in a study done in Eastern Uttar Pradesh.<sup>[11]</sup> According to Kaplan and Sadock, one of the leading risk factor for dementia is older age.<sup>[12]</sup> Also, the incidence of dementia increases with age, almost doubling every 5 years after the age of 65 years.<sup>[13]</sup> Female sex is a risk factor independent of the greater longevity of women, and also women who carry an Apo E4 allele are more susceptible.<sup>[10]</sup> The reason for female

**Table 3: Multivariate Logistic Regression**

Variable	Unadjusted OR*	95% CI <sup>†</sup> of OR	P
Age (in years)			
60 - 65	Ref		
66 - 70	1.17	0.50 - 2.70	0.716
71 - 75	3.80	1.73 - 8.36	<b>0.001</b>
76 - 80	8.65	3.26 - 22.96	<b>&lt;0.001</b>
>80	13.47	4.87 - 37.26	<b>&lt;0.001</b>
Sex			
Male	Ref		
Female	2.94	1.00 - 8.63	<b>0.050</b>

\*OR- Odd's Ratio, <sup>†</sup> CI- Confidence Interval

preponderance is, in postmenopausal women there is oestrogen deficiency which may promote development of central obesity and metabolic syndrome. This syndrome has been implicated in the development of age related CI and Dementia among women. But a study done in Gujarat, India, showed a higher prevalence among male than female of the study group.<sup>[14]</sup>

The prevalence of CI in our study was found to be higher among widow/widower ( $p < 0.001$ ) which is similar to a previous study<sup>[11]</sup> and a study done in Brazil.<sup>[15]</sup> This may be due to a better social life in married subjects, although this has not been reported in other studies and needs more evaluation. Prevalence of CI was found to be high among the illiterate population in our study which was similar to a study done in Eastern Uttar Pradesh. The study states that a prevalence of 12.6% was found among uneducated participants and it gradually decreased as the educational level increased ( $p = 0.000$ ).<sup>[11]</sup> A study performed on Indians residing in Singapore suggests that lower education was independently associated with CI.<sup>[16]</sup> This proves that education even of the primary level reduces prevalence of CI in older age. Mathuranath *et al.*<sup>[17]</sup> also reported the association of low education with dementia. But, in a study conducted by Shaji<sup>[7]</sup> there was no significant difference in the total MMSE scores between the literate and the illiterate.

The prevalence was found more among participants practicing Christian religion (33.3%) compared to Hindu and Muslim, but this needs further evaluation. According to our study, the prevalence was also higher among population staying at home (11.3%), maybe because they have limited social interaction and activities. A study conducted in Beijing states that less social interaction (OR = 1.011–2.147,  $P = 0.044$ ), is an independent risk factor for CI.<sup>[18]</sup> Similarly, an association between type of family and status of dementia showed a lower prevalence (4.7%) among elderly residing in three generation families. This is possibly because of a healthier atmosphere and number of helping members in the family, which strengthens the relevance of Indian culture in the study.

Majority 44 (67.7%) of caregivers had mild or moderate health care burden according to Caregiver Burden Scale. A study done in Brazil stated that the average burden on Zarit Caregiver Burden Scale was 30.3<sup>[15]</sup> almost similar average scale as us (32.2). More decline in cognition more is demand for care, thus overloading the caregivers' responsibilities.

## Conclusion

From our study, we can conclude that as age advances the prevalence of CI increases, imposing a greater demand on health care. But, Government is still grappling with issues of communicable diseases and maternal and child health, whereas geriatric health care is in dire need for more resources. The findings of our study have implications for primary health care and geriatric societies.

At Primary Health Centre (PHC), screening for Non-Communicable Diseases (mainly Diabetes and Hypertension) is ongoing since 2012. The assessment of cognitive function using MMSE, can be done by health worker with minimum training. Therefore, we suggest that when the health worker is screening for non-communicable diseases he/she can spend another 10 minutes for assessment of CI. This small step will go a long way in improvement of rural elderly's quality of life. In India, the burden of dementia care in rural area is still with families, and very little help is available. So, urgent action is needed in the form of day care and residential care for the elderly with dementia by government and geriatric societies.

## Summary of the study

Proven risk factors for CI, age, sex, and literacy status were confirmed in our study. New risk factors like losing their spouse, less social interaction, and involvement and staying by themselves as a couple or alone were identified. Religion as a risk factor for CI needs further studies to evaluate the aetiology.

We conclude that priority must be given to the older–older age group and females, as they are more vulnerable to impaired cognitive function. Further, the entire society including the health care sector, governmental and non-governmental organizations, need to join hands in order to enable effective social participation for improving the living conditions of the older adults.

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## Conflicts of interest

There are no conflicts of interest.

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